

What is claimed is:

- 5 1. A method for building a computational model of human perception of a descriptor of music, comprising:

- 10 a) extracting from each of at least 5 electronic representations of musical recordings at least two numeric parameters;
- b) for each recording, combining the numeric parameters with a weighting for each parameter to compute a single number representing the descriptor for that recording;
- c) adjusting the weightings for the parameters to find a set of weightings where each computed descriptor for each recording most closely matches perceptions reported for the recording by one or more human listeners.

- 15 2. A computer readable medium containing a computer program which causes a computer to perform the method of claim 1.

3. A method for generating a data record associated with a music recording, the record comprising two or more scalar descriptors, each descriptor numerically describing the recording of music with which the data record is associated, comprising:

- 20 a) extracting from an electronic representation of the recording of music at least two numeric parameters;
- b) combining the numeric parameters with a weighting for each parameter to compute a single number representing the descriptor for that recording, where the weightings were previously determined by:

- 25 c) extracting from an electronic representation of each of at least 5 musical recordings the same at least two numeric parameters;
- d) for each recording, combining the numeric parameters with a weighting for each parameter to compute a single number representing the descriptor for that recording;

- e) adjusting the weightings for the parameters to find a set of weightings where each computed descriptor for each recording most closely matches perceptions reported for the recording by one or more human listeners.

5 4. A computer readable medium containing a computer program which causes a computer to perform the method of claim 3.

5. A computer readable medium containing a computer extracted data record associated with a music recording, the record comprising:

10 two or more scalar descriptors, each descriptor numerically describing the recording of music with which the data record is associated, where each descriptor was generated by:

- a) extracting from an electronic representation of the recording of music at least two numeric parameters;
- b) combining the numeric parameters with a weighting for each parameter to compute a single number representing the descriptor for that recording, where the weightings were previously determined by:
- c) extracting from an electronic representation of each of at least 5 musical recordings the same at least two numeric parameters;
- d) for each recording, combining the numeric parameters with a weighting for each parameter to compute a single number representing the descriptor for that recording;
- e) adjusting the weightings for the parameters to find a set of weightings where each computed descriptor for each recording most closely matches perceptions reported for the recording by one or more human listeners.

25 6. A method for searching a database of data records associated with music recordings to find a desired recording, comprising:

- a) identifying a comparison data record associated with a music recording in a computer readable database containing a plurality of data records, each associated with a music recording, the data records each comprising two

or more scalar descriptors, each descriptor numerically describing the recording of music with which the data record is associated, where each descriptor was generated by:

- 1) extracting from an electronic representation of the recording of music at least two numeric parameters;
 - 2) combining the numeric parameters with a weighting for each parameter to compute a single number representing the descriptor for that recording, where the weightings were previously determined by:
 - 3) extracting from an electronic representation of each of at least 5 musical recordings the same at least two numeric parameters;
 - 4) for each recording, combining the numeric parameters with a weighting for each parameter to compute a single number representing the descriptor for that recording;
 - 5) adjusting the weightings for the parameters to find a set of weightings where each computed descriptor for each recording most closely matches perceptions reported for the recording by one or more human listeners; and
- b) searching the database to find data records with descriptors that are similar to the descriptors of the comparison record.

7. The method of claim 6 further including, prior to searching the database, specifying that one of the descriptors of the comparison data record should be adjusted with an increase or a decrease, and the searching step is based on the descriptors of the comparison data record as adjusted.

8. A computer readable medium containing a computer program which causes a computer to perform the method of claim 6.

9. A computer readable medium containing a computer program which causes a computer to perform the method of claim 7.

10. A method for building a computational model of human perception of likeness between musical recordings, comprising:

- a) extracting from each of at least 5 electronic representations of musical recordings at least two numeric parameters;
- b) receiving from one or more human listeners who compare pairs of the musical recordings an indication of the human's perception of likeness for each compared pair of recordings;
- c) for each compared pair of the recordings, comparing each numeric parameter of one recording in the pair with the corresponding parameter of the second recording of the pair using an algorithm which produces a parameter comparison number representing the parameter comparison;
- d) for each compared pair of the recordings, combining the parameter comparison numbers with a weighting for each parameter comparison number to compute a single difference number representing the difference between the two recordings of the pair;
- e) adjusting the weightings for the comparison numbers to find a set of weightings where each computed difference number for each pair of recordings most closely matches perceptions reported for the pair of recordings by the one or more human listeners.

11. The method of claim 10 where the algorithm includes subtraction of parameter values.

12. The method of claim 10 where the algorithm includes computing a correlation between parameter values.

13. The method of claim 10 where, prior to the step of comparing the numeric parameters:

- a) the parameters for each recording are combined with a weighting for each parameter to compute a single number representing a descriptor for that recording, where
- b) the weightings were previously determined by adjusting the weightings to find a set of weightings where each computed descriptor for each recording most closely matches perceptions reported for the recording by one or more human listeners, and

c) the descriptors are then used in the step of comparing the numeric parameters in place of the parameters.

14. A computer readable medium containing a computer program which causes a computer to perform the method of claim 10.

5 15. A computer readable medium containing a computer program which causes a computer to perform the method of claim 11.

16. A computer readable medium containing a computer program which causes a computer to perform the method of claim 12.

17. A computer readable medium containing a computer program which causes a computer to perform the method of claim 13.

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Sub A17 18. A method for creating a database of differences between music recordings, comprising:

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- a) associating an identifier with each recording of a plurality of music recordings;
 - b) extracting from each recording of the plurality or recordings at least two numeric parameters;
 - c) computing from the extracted parameters for each of a plurality of pairs of the recordings a number which represents the difference between the recordings of the pair; and
 - d) assembling the computed difference numbers into a database where each computed difference is associated with the identifier for each of the two recordings from which the difference was computed.
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19 The method of claim 18 where the computing step includes subtraction of parameter values.

25 20 The method of claim 18 where the computing step includes computing a correlation between parameter values.

21 The method of claim 18 where the algorithm used to compute numbers which represent differences between pairs of recordings is empirically developed based on perceptions reported by one or more human listeners.

22. A computer readable medium containing a computer program which causes a computer to perform the method of claim 18.
23. A computer readable medium containing a computer program which causes a computer to perform the method of claim 19.
- 5 24. A computer readable medium containing a computer program which causes a computer to perform the method of claim 20.
25. A computer readable medium containing a computer program which causes a computer to perform the method of claim 21.
- Sub 26
10 26. A method for finding a music recording which is perceived by humans to be like another music recording, comprising:

- a) receiving a specification of a target music recording; and
- b) searching a database containing computed difference numbers between the target recording and a plurality of other recordings for those recordings which have a small computed difference number from the target music recording.

27. The method of claim 26 where the database is created by:
- a) associating an identifier with each recording of a plurality of music recordings;
- b) extracting from each recording of the plurality or recordings at least two numeric parameters;
- c) computing from the extracted parameters for pairs of the recordings a number which represents the difference between the recordings of the pair; and
- d) assembling the computed difference numbers into a database where each computed difference is associated with the identifier for each of the two recordings from which the difference was computed.
28. The method of claim 27 where the step of computing numbers which represent differences between pairs of recordings is empirically developed based on perceptions of one or more human listeners.

29. The method of claim ²⁷~~28~~ where the step of computing a number which represents the difference between the recordings of a pair of recordings includes the intermediate steps of:

- a) combining the parameters for each recording with a weighting for each parameter to compute a single number representing a descriptor for that recording, where
- b) the weightings were previously determined by adjusting the weightings to find a set of weightings where each computed descriptor for each recording most closely matches perceptions reported for the recording by one or more human listeners, and
- c) the descriptors are then used in place of the parameters to compute a number which represents the difference between the recordings of the pair.

30. A computer readable medium containing a computer program which causes a computer to perform the method of claim 26.

31. A computer readable medium containing a computer program which causes a computer to perform the method of claim 27.

32. A computer readable medium containing a computer program which causes a computer to perform the method of claim ~~28~~.

33. A computer readable medium containing a computer program which causes a computer to perform the method of claim 29.